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ABSTRACT

This memorandum reports results of an analysis designed to obtain answers to the following questions: (1) How does the Overall High School Average compare with Converted Rank in Class as a predictor of Freshman Year Grades in college? and (2) Will more detailed information provided by analysis of high school records by subject help to improve accuracy of forecasts of college grades or to improve understanding of factors associated with performance in college? The study is based on students who entered CRC-member colleges in September 1966, who earned a freshman year average during academic 1966-67, and for whom scores on the Scholastic Aptitude Test, the average of CEEB achievements, coverted rank, a cumulative high school average, and averages in high school English, languages, mathematics, sciences, and social studies were available. The results indicate that the overall high school average, as compared with the Converted School Rank, yields higher simple correlations with freshman year average in 10 of 16 comparisons, and approximately equal or only slightly lower coefficients in the remainder of comparisons, and when combined with three standardized test variables, yields higher multiple correlations with freshman year average in 9 of 16 comparisons, and approximately equal or only slightly lower coefficients in the remainder of cases. When averages in five subjects are treated rather than the cumulative high school average, results indicate that the more detailed information about the high school record shows promise of improving predictions of freshman year performance and has value from the point of view of gaining insight into the aspects of the high school record most closely associated with college freshman performance. (DB)

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College Research Center

at

Educational Testing Service
Princeton, New Jersey 08540

Memo to: CRC - Member Colleges

From: Kenneth M. Wilson

Date: November 2, 1970

Subject: The High School Average

CRC-member colleges have used a standard conversion of secondary school rank in class as one element in their appraisal of candidates for admission. The converted secondary school rank (ConRk), of course, is a global index of student secondary school standing and, as such, has proved to be one of the principal predictors of academic performance during the college years.

Another popular general index of secondary school performance, namely, the cumulative high school average (HSA), has not been used systematically by CRC-member colleges.

As between these two general indices of secondary school standing, rank in class has the advantage of administrative convenience, requiring less processing, and it says something about a candidate's status vis-à-vis peers that is not conveyed directly by the average of high school marks.

Neither of these general indices of secondary school performance sheds light on questions as to, for example, whether a candidate's record is consistent or spotty, or, if spotty, where the high and low (higher and lower) points are, etc. Examination of high school grade point averages by academic subject provides greater detail about the school record.

This memorandum reports results of an analysis designed to obtain answers to the following questions:

1. How does the Overall High School Average compare with Converted Rank in Class as a predictor of Freshman Year Grades in college?
2. Will more detailed information provided by analysis of high school records by subject help to improve accuracy of forecasts of college grades or to improve understanding of factors associated with performance in college?

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Sample

The study is based on students entering CRC-member colleges in September 1966 (members of the Class of 1970), who earned a freshman year average during academic 1966-67, and for whom scores on the Scholastic Aptitude Test; the average of CEEB achievements; converted rank; a cumulative high school average; averages in high school English, languages, mathematics, sciences, and social studies, respectively, were available. In some instances, individuals with a freshman year average were included without their having scores on one or two of the predictors. Data were submitted to the Validity Study Service of CEEB (at ETS, Princeton).

The results reported herein have not been cross-validated.

Summary of Findings

Based on freshman year data for the Class of 1970, the following trends may be cited regarding the relationship between freshman year average grade and converted school rank, the cumulative high school average, and five high school subject averages:

1. The cumulative high school average, particularly for public school graduates, tends to be a better predictor than the converted school rank when these two variables are considered individually. In the few instances where it is not better it tends to be about equally good (or poor). [Compare columns (5) and (6), Table 1.]
2. When these two "global" indices of high school performance are treated as elements in a predictive battery with SAT-Verbal, SAT-Mathematical, and the Average of all CEEB Achievement Tests--i.e., best weighted combination, V + M + AchAv + ConRk versus V + M + AchAv + High School Average--the results provide somewhat less basis for choice between them. However, in six of eight comparisons involving public school graduates, higher coefficients of multiple correlation resulted when HSA rather than Rank was included in the battery, and similar results obtained in four of eight comparisons involving private school students. And, generally speaking, in those cases where use of HSA did not yield a higher multiple correlation

Table 1

Comparative Validity of Selected Predictors and Combinations of Predictors When Criterion Is College Freshman Year Average, CRC-Member Colleges (Women), by Type of Secondary School Attended

Groups	Multiple correlation (1) SAT-V + SAT-M + AchAv + Rank	(2) SAT-V + SAT-M + AchAv + HS GR AV	(3) V+M+AchAv+ Engl+Lang+ Math+ Sci+ Soc Stu*	(4) Engl+Lang+ Math+ Sci+ Soc Stu	Zero-order correlation (5) High Sch Grade Average, Overall*	(6) Converted Secondary School Rank
Public (mean)	(51)	(54)	(56)	(46)	(41)	(34)
College H	556	588	604	520	505	462
F	450	470	535	501	287	206
G	259	330	364	236	191	108
D	640	673	672	532	546	445
J	714	718	736	698	683	540
A	584	573	583	334	316	324
B	416	449	486	401	344	310
C	374	366	409	349	318	322
Private (mean)	(49)	(50)	(55)	(41)	(36)	(33)
College H	606	651	683	460	464	410
F	453	521	573	518	471	272
G	397	394	414	323	293	313
D	409	392	441	375	348	348
J	557	560	561	416	402	387
A	652	625	661	388	347	472
B	346	341	482	373	260	270
C	468	446	534	383	252	137

Note: Leading decimals have been omitted. Mean values derived via transformation into Fisher's z coefficients. In addition to the three test variables, predictors involved in the analysis are General High School Average, grade averages in high school English, language, mathematics, science, and social studies, respectively, and the Converted Secondary School Rank. N's for analyses involving Rank may differ slightly from N's for analyses involving grade average data. Data are for the Class of '70.

*Cumulative average based on all courses taken, including courses not classifiable as English, languages, mathematics, science, or social studies.

than use of Rank, the difference in validity was small. [Compare columns (1) and (2), Table 1.]

What do we gain by calculating five high school academic subject averages rather than a single, cumulative grade average for all high school work?

3. As expected, a best-weighted combination of secondary school grades in five subject areas, namely, English, languages, mathematics, sciences, and social studies, is more closely correlated with college freshman year average than the overall high school average. [Compare columns (4) and (5), Table 1.] Results in Table 1 [Compare (4), (5), and (6)] clearly indicate that high school subject matter averages provide more information of potential value for predicting college grades than either the overall high school average or converted rank in class even though the "information gain" in using five subject averages is not uniformly great.

   On the average, coefficients involving the five high school subject matter averages, only, were about .05 greater than coefficients involving the overall high school average, only, and .08 points greater than those involving converted rank, only.

   In some cases, however, use of subject averages resulted in considerably larger increases in correlation:

Public graduates--	Overall HSA	Five subject-matter averages
Briarcliff	.287	.501
Vassar	.344	.401
Private graduates--		
Vassar	.260	.373
Wheaton	.252	.383

   Adding the three standardized test variables to the five high school subject averages yields multiple correlation coefficients averaging approximately .10 points higher than R's for five HSA subject averages, only.

4. Based on the findings in Table 1, and considering only the criterion of potential contribution to prediction of freshman year average, treatment of the High School Average, by subject and/or overall, would appear to be worthwhile for CRC-member colleges, especially for Vassar

(both public and private school grads), Connecticut (public school grads), Briarcliff (public and private), and Randolph-Macon Woman's (public and private).

At Hollins, Mount Holyoke, Trinity, and Wheaton Colleges, multiple correlations based on test variables and rank are similar in magnitude to those based on test variables and the high school average, either cumulative or by subject, for both public and private school graduates. However, further study of the diagnostic potential of the five high school subject averages is in order.

Comparative Validity of High School Subject Averages

Which of the several high school averages is most closely related to freshman year average in college? The data in Table 2 help us to answer this question. Clearly, no single answer emerges. Of the five high school subject averages studied, the one showing highest correlation with freshman year grades, at each college, for graduates of public and private schools, respectively, was identified as follows:

HSA in Subject	College(s) at which the subject is best among five HSA subject predictors	
	Public sch grads	Private sch grads
HSA in English	None	R-MWC Trinity
HSA in Languages	Briarcliff Hollins Mount Holyoke	Briarcliff
HSA in Mathematics	R-MWC Trinity	None
HSA in Science	Vassar Wheaton	Hollins Mount Holyoke
HSA in Social Studies	Connecticut	Connecticut Vassar Wheaton

Table 2

Comparative Validity of High School Subject Averages When Criterion Is College First-year Grade Average, CRC-Member Colleges (Women), by Type of Secondary School Attended

College School Type	Zero-order correlation						Multiple correlation
	High Sch. Grade Average, General#	H. S. grade average by subject					Best linear combination Five subject averages
		Engl	Lang	Math	Sci	Soc Stu	
Public							
College H	505	38	41	45*	42*	37	520
F	287	29	36	-07	27	20*	501
G	191	02	11*	16	17	17	236
D	546	42	46	45	39	37	532
J	683	54	54*	65*	48	58	698
A	316	19	28	24	25*	20	334
B	344	17	27	24	36*	27	401
C	318	23	26	14	30	26	349
Private							
College H	464	41*	40	33	35	28*	460
F	471	31	42	39	38	38*	518
G	293	18	19	14	23*	31	323
D	348	27	27	24	35	30	375
J	402	40*	35	30	32*	32	416
A	347	24	29	24	35	26*	388
B	260	12	16	14	26*	31	373
C	252	22	21	02	26	28	383

#This is the cumulative high school average based on all courses taken, including courses not classifiable as English, languages, mathematics, science, or social studies.

*This variable has largest beta weight when all five subject averages are considered simultaneously.

_This variable has highest zero-order correlation with college grade average.

The potential value of looking at the high school record by subject is suggested by the fact that in several instances one high school subject average is more closely related to college freshman year grades than the average of all high school grades, and in several other instances a single subject average is almost as valid as the overall average (see Table 2). For example, for public school graduates at Vassar, HSA in Science is more closely related to college grades than the overall (cumulative) HSA. Of course, the validity of the best-weighted linear combination of the five subject averages exceeds or tends to equal that of the overall average.

Summary and Conclusions

This study has examined the relationship of Converted School Rank, the overall high school average, and five high school subject-matter averages, singly and in combination with test variables, to college freshman year averages among students entering eight CRC-member colleges in September 1966.

The evidence presented* indicates that the overall high school average, as compared to the Converted School Rank,

> ...yields higher simple correlations with freshman year average in 10 of 16 comparisons, and approximately equal or only slightly lower coefficients in the remainder of comparisons; and when combined with three standardized test variables,
>
> ...yields higher multiple correlations with freshman year average in nine of 16 comparisons, and approximately equal or only slightly lower coefficients in the remainder of cases.

When averages in five subjects (HSA in English, languages, mathematics, sciences, and social studies) are treated, rather than the cumulative (overall) high school average, results indicate that the more detailed information about the high school record,

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*Additional information about the study is provided in Table 3 (intercorrelations of high school subject averages), Table 4 (means and standard deviations of basic variables), and Table 5 (means and standard deviations of high school subject averages for entering students, by type of school attended).

...shows promise from the point of view of improving predictions of freshman year performance, especially so at Vassar, Connecticut, Briarcliff, and Randolph-Macon Woman's College (and to some extent at Wheaton), and

...has value from the point of view of gaining insight into the specific aspects of the high school record which are most closely associated with college performance during the freshman year.

It should be remembered in this connection that the utility of high school subject averages for forecasting a general freshman year average may well be less than their utility for forecasting college averages in related subjects.

The validity of these same variables vis-à-vis four-year cumulative averages (or senior year averages) for members of the Class of '70 will be ascertained in a study now in progress. This study will also permit examination of the validities in samples classified according to a student's major field at graduation.

Systematic consideration of high school averages (in admission or in advisement) requires systematic procedures for obtaining and reporting these averages. Administrative feasibility must be weighed against the perceived value of the information involved.

Table 3

Intercorrelations of High School Subject

Averages, CRC-Member Colleges

Variable		Private school graduates						Public school graduates					
		En	La	Ma	Sc	SS	FAG	En	La	Ma	Sc	SS	FAG
English (En)	B	--	73	45	43	71	12	--	52	33	33	53	17
	C	--	51	33	30	58	22	--	44	19	34	58	23
	G	--	58	26	47	58	18	--	43	13	26	39	02
	H	--	72	49	57	78	41	--	65	44	56	66	38
	D	--	70	40	54	66	27	--	59	52	43	61	42
	A	--	72	37	42	66	24	--	34	21	41	57	19
	J	--	68	58	64	68	40	--	67	68	68	54	54
	F	--	49	40	40	62	31	--	60	32	37	40	29
Languages (La)	B	--	--	44	50	66	16	--	--	46	41	32	27
	C	--	--	46	31	41	21	--	--	36	44	57	26
	G	--	--	45	50	56	19	--	--	33	36	37	11
	H	--	--	62	61	58	40	--	--	54	59	60	41
	D	--	--	54	58	56	27	--	--	66	53	49	46
	A	--	--	51	42	56	29	--	--	44	43	32	28
	J	--	--	69	67	66	35	--	--	64	69	62	54
	F	--	--	63	44	41	42	--	--	26	35	39	36
Mathematics (Ma)	B	--	--	--	61	45	14	--	--	--	59	34	24
	C	--	--	--	44	29	02	--	--	--	53	29	14
	G	--	--	--	54	34	14	--	--	--	38	25	16
	H	--	--	--	54	37	33	--	--	--	51	50	45
	D	--	--	--	56	41	24	--	--	--	56	49	45
	A	--	--	--	55	35	24	--	--	--	54	24	24
	J	--	--	--	69	56	30	--	--	--	56	60	65
	F	--	--	--	48	34	39	--	--	--	50	32	-07
Science (Sc)	B	--	--	--	--	49	26	--	--	--	--	42	36
	C	--	--	--	--	34	26	--	--	--	--	51	30
	G	--	--	--	--	51	23	--	--	--	--	27	17
	H	--	--	--	--	49	35	--	--	--	--	56	42
	D	--	--	--	--	58	35	--	--	--	--	45	39
	A	--	--	--	--	51	35	--	--	--	--	40	25
	J	--	--	--	--	54	32	--	--	--	--	58	48
	F	--	--	--	--	39	38	--	--	--	--	60	27
Social Studies (SS)	B	--	--	--	--	--	31	--	--	--	--	--	27
	C	--	--	--	--	--	28	--	--	--	--	--	26
	G	--	--	--	--	--	31	--	--	--	--	--	17
	H	--	--	--	--	--	28	--	--	--	--	--	37
	D	--	--	--	--	--	30	--	--	--	--	--	37
	A	--	--	--	--	--	26	--	--	--	--	--	20
	J	--	--	--	--	--	32	--	--	--	--	--	58
	F	--	--	--	--	--	38	--	--	--	--	--	20

Table 4

Measures of Central Tendency and Variability, Selected Entrance and Performance Variables, Class of 1970, Eight CRC Colleges, by Secondary School Origin

Variable		College A* Pub.	College A* Pvt.	College B Pub.	College B Pvt.	College C Pub.	College C Pvt.	College D Pub.	College D Pvt.	College F Pub.	College F Pvt.	College G Pub.	College G Pvt.	College H Pub.	College H Pvt.	College J Pub.	College J Pvt.
SAT-V	Mean	64.6	64.0	64.8	64.7	60.0	59.5	59.2	57.3	52.6	51.9	60.5	59.9	58.6	56.9	56.6	62.3
	S.D.	5.9	6.1	5.4	5.2	5.9	6.3	5.9	5.6	7.6	6.3	5.6	6.0	6.9	6.2	11.0	7.8
	N	(352)	(108)	(266)	(132)	(194)	(115)	(110)	(170)	(33)	(148)	(265)	(111)	(219)	(61)	(62)	(181)
SAT-M	Mean	63.4	61.2	62.1	62.0	58.0	57.5	56.9	55.8	51.8	51.4	59.7	59.3	[illegible]	54.9	54.1	57.5
	S.D.	7.0	8.0	6.6	7.0	6.8	5.9	7.4	7.0	6.9	7.3	6.6	5.5	[illegible]	[illegible]	11.3	7.3
	N	(352)	(108)	(266)	(132)	(194)	(115)	(110)	(170)	(33)	(148)	(265)	(111	[illegible]	[illegible]	(62)	(181)
Rank	Mean	70.2	62.0	69.0	62.2	65.7	59.1	62.3	54.3	56.0	50.0	65.9	59.7	[illegible]	55.8	65.2	63.0
	S.D.	4.9	5.4	5.7	6.9	5.0	5.9	6.2	6.5	5.8	8.7	4.9	6.4	6.1	6.8	6.3	5.8
	N	(349)	(105)	(264)	(123)	(187)	(105)	(106)	(147)	(38)	(134)	(248)	(95)	(220)	(54)	(59)	(183)
Ach	Mean	64.5	65.1	64.4	65.5	59.6	61.0	57.2	58.4	53.3	54.2	61.3	63.0	56.8	56.8	55.2	57.9
	S.D.	5.0	4.5	4.4	3.5	5.5	4.5	5.6	5.4	7.2	5.8	4.8	5.4	5.5	5.2	9.3	6.2
	N	(352)	(108)	(267)	(132)	(194)	(115)	(110)	(169)	(30)	(146)	(266)	(111)	(219)	(60)	(60)	(181)
FAG	Mean	7.8	7.5	2.7	2.6	7.7	7.5	1.7	1.5	2.5	2.5	2.5	2.4	1.6	1.3	2.6	2.8
	S.D.	1.4	1.3	.4	.4	1.4	1.3	.4	.4	.3	.5	.4	.4	.6	.5	.5	.4
	N	(343)	(109)	(258)	(128)	(190)	(111)	(108)	(165)	(43)	(153)	(255)	(108)	(217)	(59)	(55)	(180)
HSA	Mean	3.8	3.3	3.7	3.3	3.5	3.1	3.3	2.7	2.7	2.4	3.6	3.1	3.4	2.9	3.3	3.2
	S.D.	.3	.4	.3	.4	.4	.4	.5	.5	.5	.4	.3	.4	.4	.5	.5	.5
	N	(352)	(106)	(268)	(131)	(194)	(115)	(112)	(172)	(42)	(158)	(268)	(114)	(225)	(61)	(61)	(184)
PFG	Mean	.7	.7	2.6	2.6	2.3	2.2	1.5	1.3	2.5	2.5	2.5	2.4	1.6	1.3	1.5	1.5
	S.D.	.1	.1	.2	.2	.2	.1	.3	.2	.3	.2	.2	.2	.3	.3	.3	.3
	N	(349)	(104)	(261)	(231)	(186)	(105)	(104)	(145)	(28)	(125)	(246)	(93)	(213)	(53)	(57)	(180)

Note: These statistics for the Class of 1970 are based on analyses performed by the Validity Study Service of the College Entrance Examination Board, at the request of the College Research Center.

*Standard letter codes for identifying CRC-member colleges as adopted in May 1965.

Table 5

Means and Standard Deviations of High School Grade Point Averages, Class of 1970, CRC-Member Colleges

	High Sch. Average, General	High school grade averages by subject				
		English	Languages	Mathematics	Science	Social Studies
Briarcliff						
Mean	25.0	26.1	24.1	22.4	24.6	25.7
S.D.	4.6	5.4	6.3	7.2	6.4	5.8
Connecticut						
Mean	34.4	34.9	34.1	32.9	33.2	35.0
S.D.	3.9	4.8	5.0	5.5	5.0	4.5
Hollins						
Mean	29.4	30.5	28.7	27.2	28.7	30.3
S.D.	5.7	6.2	6.9	7.5	7.4	6.3
Mount Holyoke						
Mean	36.4	36.9	36.0	35.3	35.3	36.6
S.D.	3.7	4.3	4.5	5.0	4.8	4.0
R-MWC						
Mean	33.3	34.8	32.8	30.9	31.8	34.6
S.D.	4.9	5.2	5.8	6.8	6.4	5.6
Trinity						
Mean	31.8	32.8	32.0	30.1	30.9	32.8
S.D.	4.7	4.7	5.4	6.8	5.9	5.1
Vassar						
Mean	35.7	36.3	35.3	34.3	34.7	36.1
S.D.	4.2	4.6	5.1	5.7	4.8	4.4
Wheaton						
Mean	33.6	34.2	33.4	31.2	32.3	34.4
S.D.	4.2	4.9	5.1	6.1	5.2	4.7
Combined sample						
Mean	33.9	34.6	33.6	32.2	32.7	34.4
S.D.	5.3	5.6	6.0	6.9	6.2	5.6

Note: High School Grades were converted to a scale such that 40 = A, or other equivalent, 30 = B, 20 = C, 10 = D, and 0 = F. For description of grade-conversion procedures, see College Entrance Examination Board, Cooperative Admissions Information System (White Plains, N.Y.: IBM, Technical Publications Department, 1967).